

## ※注意：

Part I(單選題)請作答於試卷內之「選擇題作答區」。

Part II(簡答題)及 Part III(程式題)請於「非選擇題作答區」依序作答，並請務必註明作答之大題及其題號。

**Part I Multiple choice (單選題) (30%)**

*Instruction: Please select the letter of the most appropriate answer for each question.*

1. Which of the following data structure is often used for calculating  $((1 + 2) * 4) + 3$  in postfix notation like  $1\ 2\ +\ 4\ * \ 3\ +$  with the advantage of no precedence rules and parentheses needed?  
(a) stack (b) queue (c) map (d) set
2. Which of the following methods is NOT related to development of Search & Optimization approaches?  
(a) Simulated Annealing (b) Genetic Algorithm (c) Neural Network (d) Linear Programming
3. Which term is NOT used to describe Building Information Modeling technology?  
(a) spatial (b) digital (c) life cycle (d) static
4. In symbolic logic, the logic state NOT ( $A$  AND  $B$ ) is equal to  
(a)  $A$  OR  $B$  (b) (NOT  $A$ ) AND  $B$  (c) (NOT  $A$ ) OR (NOT  $B$ ) (d) (NOT  $A$ ) AND (NOT  $B$ )
5. The technique whereby the computer system puts jobs in a buffer, a special area in memory or on a disk where a device can access them when it is ready, is called  
(a) multitasking (b) time-sharing (c) spooling (d) pooling
6. An 8-bit video card uses 8 bits to store information about each pixel and thus the number of different colors it can display is  
(a)  $8 + 2$  or 10 (b)  $8 \times 2$  or 16 (c)  $8^2$  or 64 (d)  $2^8$  or 256
7. The hexadecimal number 4F is equivalent to the decimal number  
(a) 69 (b) 79 (c) 89 (d) 98
8. Which of the outcomes from the object-oriented approach has the highest reusability?  
(a) Class Diagram (b) Use Case (c) Object-Oriented Program (d) Object Diagram
9. Which type of the following engineering task does not require a closed-world hypothesis?  
(a) analysis (b) design (c) diagnosis (d) none of the above
10. Which one of the following field concerns how easy people can employ a computer in order to achieve a particular goal?  
(a) SGI (b) CGI (c) ACM (d) HCI

**Part II Question and Answer (簡答題) (40%)**

*Instruction: Write brief but complete answer for each of the following questions*

1. What are the computer and information technologies that can be used to help managing facility maintenance tasks in a building? Please briefly list ALL the major hardware and software technologies needed with explanation on the role each technology plays (or functions it provides). (12%)
2. Please describe the mapping between the following two sets: {entity, relation, attribute, record} and {table, row, column} in relational database. (8%)
3. Please briefly explain the concept of recursion in computer programming. (8%)
4. Please describe the logical steps in finding the real roots of the equation  $x^3 + ax^2 + bx + c = 0$  between the interval of  $p$  and  $q$ , in which  $a, b, c, p, q$  are all given integers. (12%)

**Part III Programming (程式題) (30%)**

*Instruction: You should write the program using one of the following programming languages: Fortran, C, C++, C#, or Java. Code comments are necessary if the statement is not straightforward. The computational efficiency, exception handling, and programming style will be considered in grading.*

1. (15%) Write a program to loop from 1000 to 9999 and output those numbers that have the following property: if you split a four-digit number into two parts, one having the first two digits and the other having the last two digits, and add the square of these two numbers, you get the original four-digit number. This is true, for example, for 1233:

$$1233 = 12^2 + 33^2$$

2. (15%) Write a main program to compute the product (乘積) of the following two 3x3 integer matrices:

$$[A] = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 3 & 6 & 9 \end{bmatrix} \quad \& \quad [B] = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \\ 1 & 2 & 3 \end{bmatrix}$$

and print out the resulting matrix to the screen. You should assume that the following two functions have been provided (although you need to express their interfaces in the programming language you choose):

- VectorDotProduct( $v1$ ,  $v2$ ,  $n$ ) for calculating the dot product of two 1x3 integer vectors,  $v1$  &  $v2$ , and returning the result integer  $n$ .
- PrintVector( $v$ ) for printing out a 1x3 integer vector,  $v$ , to the screen.

試題隨卷繳回